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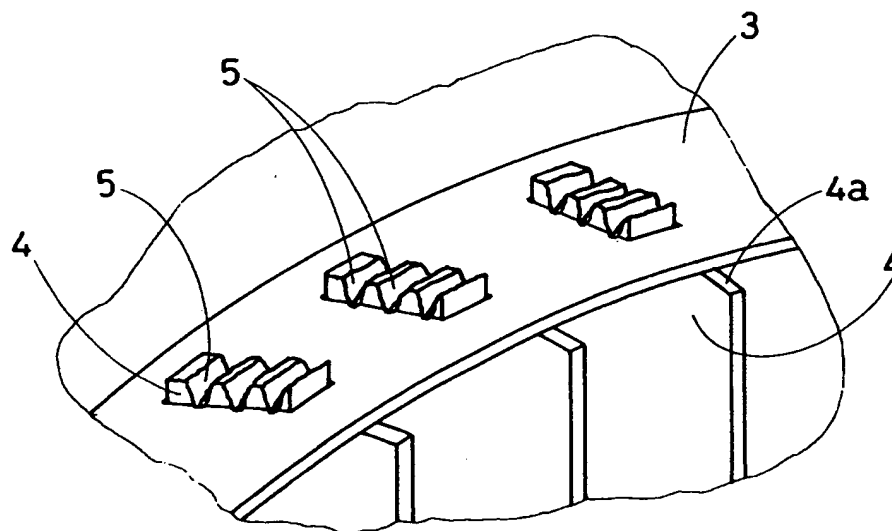
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**(54) Clamping system to block the metallic blades of centrifugal vacuum fans**

(57) The instant invention concerns a clamping system to block the metallic blades of centrifugal vacuum fans. Said procedure consists of subjecting the teeth of the vacuum fan's radial blades to a calking process, dur-

ing which several deep notches are cut into the edges of the teeth, causing them to buckle and be forcibly restrained within the related housing slots.



**FIG. 3**

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## Description

Clamping system to block the metallic blades of centrifugal vacuum fans.

The instant patent application concerns a clamping system to block the metallic blades of centrifugal vacuum fans, as well as the fan obtained as a result of this clamping system.

To better underline the advantages offered by the clamping system according to the invention, it is considered useful to refer to the operational techniques currently adopted to block the radial blades of centrifugal impellers, of the type normally fitted in domestic boilers with forced suction of fumes.

Said impellers are essentially the shape of a cylindrical cage and are made up of an annular series of curved radial blades, positioned in between a disc, fitted with a central hub, and a flat ring, with an external diameter equal to the diameter of the disc. Several models of this type of impeller do exist, made entirely of metal; wherein the blades, disc and ring are made of sheet metal.

Up to the present, two methods have been used to clamp said radial metal blades between the disc and the ring, also made of sheet metal.

The first method involves the metal blades, rectangular in shape, being fitted with a pair of flat pins at each of the two transversal edges; these, to be inserted into corresponding pairs of holes made on the disc and the ring.

These holes have a drawn edge, raised towards the outside of the impeller, while the pins should be long enough to jut out of their housing holes.

The blocking of the radial blades between the ring and the disc, takes place, according to this first clamping system, by means of a special riveting process, using a special and costly automatic machine able to clamp the flanged edge of each hole around the pin inserted into said hole.

The second method involves the metal blades being fitted with a central tang at each of the transversal edges, which is to be inserted through corresponding slots positioned on the disc and the ring.

The blocking of the blades, takes place in this case, by subjecting the tangs to a bending process at 90°, using a special machine which effects the lateral lowering and abutment of the tangs against the external surfaces of the ring and the disc.

This bending machine is simpler and therefore, less costly, than the riveting machine used in the first clamping system described above and, moreover, it also guarantees more stable and solid clamping of the blades.

The aim of the instant invention is to create a new clamping system which is able to guarantee the safe and reliable blocking of the blades, equal to the first method described above; while however, making use of a simple, economic machines, equal to the second method described above.

In the clamping system according to the invention, the metal blades have one or more teeth at their transversal edges, which are to be driven into corresponding slots made on the disc and the ring.

5 More particularly, said teeth should be high enough so as to jut slightly out of the housing slots.

In the clamping system in question, the stable blocking of the radial blades between the disc and the ring is effected by means of a calking process, through 10 which several notches are made on the protruding edge of the teeth, which are subjected to plastic deformation and take on a sawn effect.

This calking process can be carried out using simple, economic equipment, like for example, a specular 15 pair of punches opposite each other, within which to clamp the pre-assembled fan, with the radial blades already positioned between the disc and the ring.

Each of said punches could, in a preferred embodiment, consist of a circular metallic plate internally covered with several circular, concentric, pointed ribs close 20 together, which, when pressed against the protruding teeth of the blades, squash and cut the edge of said teeth, which take on a flanged, sawn shape, intended to avoid that the teeth emerge from their housing slots; and consequently determining the stable and solid blocking of the radial blades.

For further clarity of explanation, the description of the invention continues with reference to the attached drawings, reproduced for illustrative and not limitative 30 purposes, wherein:

- Fig 1 shows the fan obtained in the clamping system according to the invention, in an axonometric and schematic representation;
- 35 - Fig 2 shows the configuration of a metallic blade, before the calking process with which it is blocked between the disc and the ring of the vacuum fan;
- Fig 3 is an enlarged view of Fig.1.

40 With reference to the abovementioned figures, the fan (1), obtained from the clamping system according to the invention, is of the type made up of a disc (2) and a ring (3), both made of sheet metal, between which an annular series of radial blades (4), also made of sheet 45 metal, is positioned.

The feasibility of the clamping system according to the invention, assumes that each blade (4), has at least one tooth (4b) at its transversal edges, which is to be inserted precisely within corresponding slots (2b) and 50 (3b), positioned on the disc (2) and on the ring (3) respectively.

The height of each tooth (4b) must be such that it juts slightly out of its housing slot (2b) or (3b). The clamping system according to the invention consists of 55 subjecting the teeth (4b), after they have been inserted into the slots (2b) and (3b), to a calking process, during which several deep notches (5) are cut into the edges of the teeth (4b), and which by buckling the teeth (4b),

at the same time, forcibly restrain said teeth within their housing slots.

#### Claims

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1. Clamping system to block the metallic blades of centrifugal vacuum fans, characterised by the fact that it consists of subjecting the teeth (4b) of the radial blades (4) of the vacuum fan (1) - after they have been inserted through corresponding slots (2b) and (3b), positioned respectively on the disc (2) and on the ring (3) - to a calking process, during which several deep notches (5) are cut on the edges of the teeth (4b), which by buckling said teeth (4b), at the same time forcibly restrain these teeth within their housing slots. 10 15
2. Metallic vacuum fan, of the type made up of a disc (2) and a ring (3), both made of sheet metal, between which an annular series of radial blades (4), also made of sheet metal, is positioned; fan, characterised by the fact that each blade (4) has at least one tooth (4b) at its transversal edges (4a), which is inserted within corresponding slots (2b) and (3b) - positioned respectively on the disc (2) and on the ring (3) - wherein, each tooth (4b) is inserted following the calking process, during which several deep notches (5) are cut into the edges of the teeth (4b), which by buckling said teeth, forcibly restrain them within their housing slots. 20 25 30

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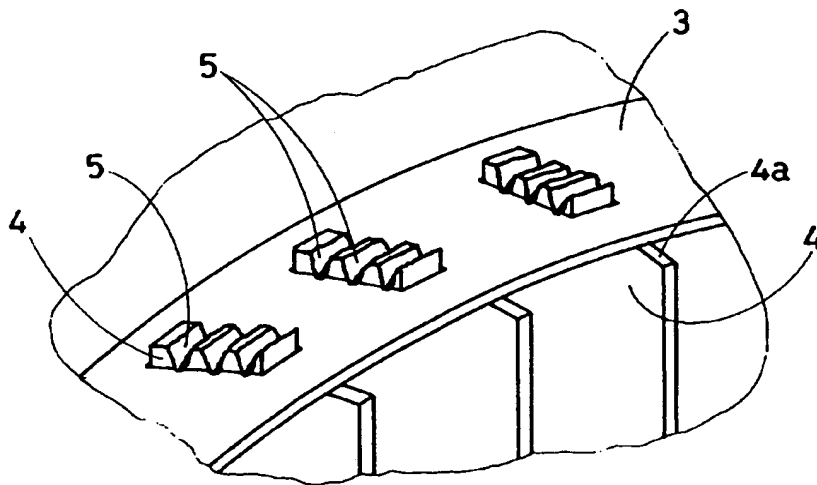
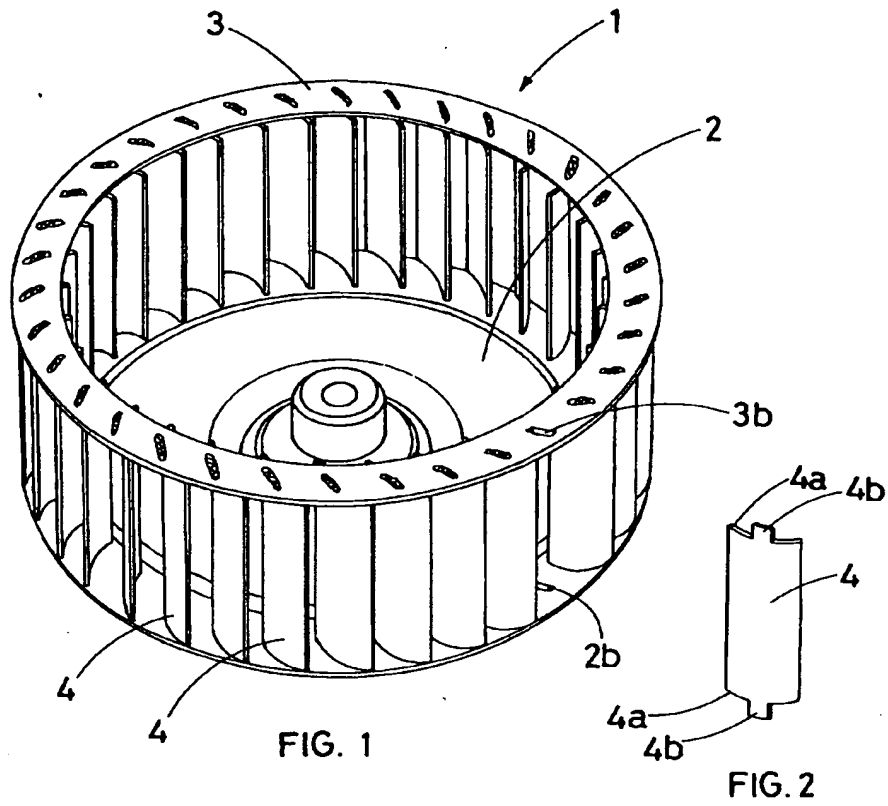


FIG. 3

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